Project 1

Due: 10/6/16

Team Member Names:_____

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Instructions:

(a) Print this page, fill in your name and attach as cover page for your report.

(b) This is a group project. Work with your group as assigned in the Lab Teams document.

(c) Submit a single report for the group and please staple it.

(d) Attach all supporting material with the report:

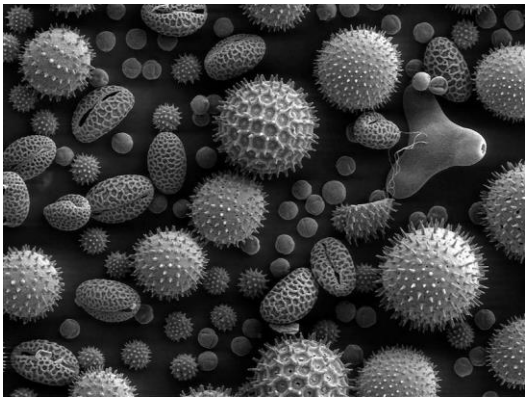
a. MATLAB code

b. Images, diagrams, figures, etc.

Project: The purpose of this project is to get familiar with the image processing toolbox in MATLAB. Review the following basic functions in MATLAB before working on this project:

`imread`	Read image from graphics file
`imshow`	Display image
`imfilter`	N-D filtering of multidimensional images
`fspecial`	Create predefined 2-D filter

Task 1: Linear filters



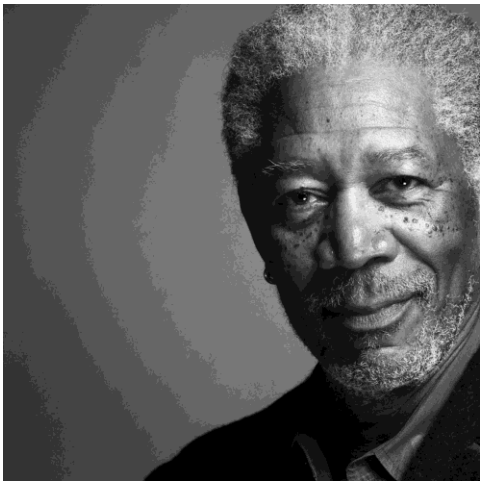
a) Process the supplied "Pollen.png" grayscale image using a 5 x 5 averaging or box filter with a weight of 1. Use the `imfilter` command to perform the correlation or convolution operation (both have same result for the averaging filter of equal weights).
   i. *Display the original and filtered images.*
   ii. *Was the resulting image sharp or blurry when compared with the original? Why?*

b) Subtract the filtered image you obtained in part (a) from the original image.
   i. *Display the resulting image.*
   ii. *How does the resulting image look like? Why?*

c) Add the image you obtained in part (b) back to the original image.
   i. *Display the resulting image.*
   ii. *Was the resulting image sharp or blurry when compared with the original? Why?*

d) Repeat the process in parts (a) through (c) using an 20 x 20 averaging filter of unit weight.
   i. *Display the resulting images.*
   ii. *How do the results compare with ones obtained in parts (a) through (c)?*

Task 2: 2D filters



a) Process the supplied "Morgan.tif" grayscale image by convolving it with the following 3 types of 5 x 5 filters that you create using the `fspecial` function:

1. 'average' Averaging filter
2. 'disk' Circular averaging filter
3. 'gaussian' Gaussian lowpass filter

Use the image sharpening technique of subtracting the resulting blurred image from the original and adding the result back to original image. Perform this technique using all 3 types of filters separately one at a time.

i. Display the resulting images.

ii. Compare the 3 blurred and sharpened images with the original image to see the relative effect of each filter. Comment on the comparison.

b) Create the special 3 x 3 sharpening filter using the `fspecial` function:

'unsharp' Unsharp contrast enhancement filter

Apply this filter to the original image to generate the sharpened image.

i. Display the resulting images.

ii. Compare the sharpened image with the original to see the relative effect of this filter. Comment on the comparison with sharpened images in part (a).